

## WHAT IS CLAIMED IS:

1. A motor control method for a parallel hybrid electric vehicle, comprising;

calculating an estimated inertia moment of a motor;

5 calculating a forward compensation current based on the estimated inertia moment and an acceleration command ;

calculating a final current command based on a speed controller output current and the forward compensation current the speed controller output current being calculated based on the acceleration command; and

10 controlling the motor using the final current command.

2. The motor control method of claim 1, wherein the estimated inertia moment  $\hat{j}_{eq}$  is calculated with the following equation:

$$\hat{j}_{eq} = \frac{1}{1 + \tau s} \times \frac{T_e}{d\omega_m/dt}$$

15 where  $\tau$  is a time constant,  $T_e$  is a motor torque, and  $\omega_m$  is a motor speed.

3. The motor control method of claim 1, wherein the forward compensation current  $i_{q-FF}$  is calculated with the following equation:

$$i_{q-FF} = a^* \times \frac{\hat{j}_{eq}}{K_T}$$

20 where  $a^*$  is an acceleration command,  $\hat{j}_{eq}$  is the estimated inertia moment, and  $K_T$  is a motor torque constant.

4. The motor control method of claim 1, wherein the final current command is calculated by summing the speed controller output current and the forward compensation current.

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5. The motor control method of claim 1, wherein the speed controller

output current is a difference between a speed command that is calculated based on the acceleration command  $a^*$  and a motor speed.

6. A motor control system for a parallel hybrid electric vehicle comprising:

a motor that is directly coupled to an engine of the parallel hybrid electric vehicle; and

a motor control unit controlling the motor,

wherein the motor control unit calculates an estimated inertia moment of the motor, and calculates a current command for controlling the motor based on the estimated inertia moment and an acceleration command.

7. The motor control system of claim 6, wherein the estimated inertia moment  $\hat{J}_{eq}$  is calculated with the following equation:

$$\hat{J}_{eq} = \frac{1}{1 + \tau s} \times \frac{T_e}{d\omega_m / dt}$$

where  $\tau$  is a time constant,  $T_e$  is a motor torque, and  $\omega_m$  is a motor speed.

8. The motor control system of claim 6, wherein the current command  $i_{qs}^*$  is calculated by summing a forward compensation current  $i_{q-FF}$  and a speed controller output current  $i_{q-PI}$ , the forward compensation current  $i_{q-FF}$  being calculated based on the estimated inertia moment  $\hat{J}_{eq}$  and the acceleration command  $a^*$ , the speed controller output current  $i_{q-PI}$  being calculated based on a difference between a speed command and a current motor speed.

9. The motor control system of claim 8, wherein the forward compensation current is calculated with the following equation:

$$i_{q-FF} = a^* \times \frac{\hat{J}_{eq}}{K_T}$$

where  $a^*$  is an acceleration command,  $\hat{J}_{eq}$  is the estimated inertia moment, and  $K_T$  is a motor torque constant.

10. The motor control system of claim 8, wherein the speed controller  
5 output current  $i_{q-P1}$  is a difference between a speed command  $\omega_m^*$  that is calculated based on the acceleration command  $a^*$ , and a motor speed  $\omega_m$ .